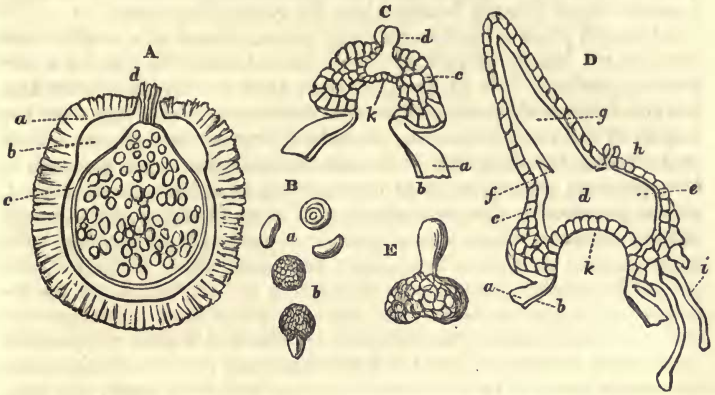
laria the protruded end of the embryo developes into an upright green filament (*primary leaf, cotyledon*), at the base of which a bud, already formed, produces a stem with long filiform leaves. The opposite end of the embryo becomes a root and breaks through, somewhat later, the green *mammilla nuclei* of the ovule, which here also appears as a sheath.



Pilularia globulifera. *A*, Transverse section of an ovule at the commencement of development; *a*, gelatinous envelope; *b*, coriaceous coat; *c*, embryo-sac filled with starch and drops of oil; *d*, mammilla of the nucleus. *B*, Pollen grains; *a*, fresh from the pollen sac; *b*, swollen in water and at the commencement of the formation of the tube. *C*, Upper part of the ovule after the penetration of the pollen tube *d*; *a*, coriaceous coat; *b*, embryo-sac; *c*, nucleus and its mammilla; *k*, layer of cells which separate the pollen tube from the embryo-sac. *E*, Pollen tube from *C* prepared free; above it shows the still uncovered portion which was inclosed in the outer pollen membrane, in the middle the more slender special tube, and below the broad expanded part already filled with cellular tissue, which developes into the embryo. *D*, Upper end of the ovule in a further advanced stage of development; *a*, coriaceous coat; *b*, embryo-sac; *c*, nucleus and its mammilla, expanded by the development of the embryo into a sac; *d*, stem-end of the embryo (*e*); *g*, primary leaf (cotyledon); *h*, pollen tube; *f*, first axillary bud; *i*, capillary, outstretched external cells of the nucleus; *k*, layer of cells which separates the embryo from the embryo-sac.

BIBLIOGRAPHICAL NOTICES.

The Physical Atlas; a series of Maps illustrating the Geographical distribution of Natural Phænomena. By H. Berghaus, LL.D., F.R.G.S. &c., and A. K. Johnston, F.R.G.S. &c.

It is with no small pleasure that we find ourselves called upon to notice this important undertaking, especially in the improved form under which it is here presented to the British world; the comprehensiveness of the design and the care which is bestowed upon its

execution are not only a presumptive evidence of the growing interest on the subject felt by the general public, whose extensive patronage alone can render the speculation remunerative, but are full of promise for the future progress of the study, since the clear and definite exposition of the state of our knowledge will serve as a solid basis for new investigation, and will point out to each special inquirer in the wide field of natural science how his labours may be rendered most directly beneficial to the general progress.

Although physical geography may be considered as a modern science, it can hardly be said to be in its infancy, for, like the sister science, geology, it is of such a nature that it could not exist as a distinct branch of study until it had obtained so many data from the results of the simple sciences, as enabled it to assume at once a high rank among the divisions of human knowledge. Like geology, in fact, physical geography must be regarded as a compound science, whose province is the generalization of facts furnished by the pure natural sciences, these two magnificent paths of philosophical inquiry parting as it were from a common point where we have to examine the mighty phænomena of existing nature which are unceasingly operating to affect the ever-changing face of the earth; while one recedes into the dark and unfathomed depths of time, the other leads us forward into the light spreading over the living world, and makes clear to us the wonders among which we dwell, the treasures that surround us, and in addition to the surpassing practical relations to human interests which such a course possesses, the intellectual pride of those who follow it is both encouraged and chastised as it feels its way step by step to a clear insight into the works around it, which are at once the proof of man's high destiny and the evidence of his insignificance.

It is at a happy period that this work makes its appearance among us; when the first of physical geographers is laying before us the great generalizations, the fruits of a life devoted to the personal investigation of the grandest of terrestrial phænomena. Now that the illustrious Humboldt is giving to the world his philosophic summary of the natural laws, and the interest in these speculations is so rapidly extending, it will be no small advantage to those whose opportunities have not admitted of their becoming acquainted with these matters, to meet with a work, in which the results of the labours of the sons of enterprise, the voyager, the traveller, naturalist, hydrographer, &c., are philosophically systematized by the more tranquil efforts of deductive science and presented in a tangible form; from which, by a careful study of a few maps comprehensible by any one of common intelligence and application, they may acquire an amount of knowledge which years of reading of the works in which the facts have hitherto been stored up would not have given so clearly, nor fixed so firmly in the memory.

Indeed an acquaintance with the subjects illustrated by these maps must ere long become a necessary part of an enlightened education, and much gratitude is due to Dr. Berghaus, the author of the original German work, and to Mr. Johnston, to whose skill and enter-

prise we owe the present improved edition, for the truly scientific spirit in which they have performed their task. If it were a question of utility alone, this Atlas should be in the hands of all who profess to teach geography.

The execution of the work is quite worthy of the subject. In the five Parts now before us, forming half the work, we have fifteen beautiful coloured maps, many of them containing a number of details on an enlarged scale, the size being imperial folio. Each Part contains three maps with descriptive text. The work is divided into the two general heads, Inorganic and Organic nature; the former including,—1. Meteorology and Magnetism; 2. Hydrology, and 3. Geology; the latter, Phytology and Zoology; but the maps are not published in any regular order.

Part the first contains,—1. a Physical Chart of the Atlantic Ocean, 2. a map of the Mountain Systems of Europe, and 3. a map of the Distribution of Plants in a horizontal and perpendicular direction. The last is based chiefly upon Humboldt's statistics, and exhibits also Schouw's twenty-five phyto-geographic regions, or tracts over which certain families of plants predominate; this is a very interesting map, and is made the more valuable by a quantity of statistical information; while the description contains a clear summary of the principal facts of the geography of plants recorded by various botanical travellers.

Part the second commences with a map of a similar character, exhibiting the range of some of the mammiferous families, namely, 1. Quadrumana; 2. Marsupialia; 3. Edentata, and 4. Pachydermata. The editors express the difficulties they have met with in this division of the subject, and account for what may perhaps appear to naturalists to be a meagreness of its details, by reminding us of the large number of maps which a complete view of the distribution of animals would require. We think they have done wisely in resolving to give a moderate amount of information *clearly* rather than to crowd the map with a greater abundance of minor facts, which would have involved at least the appearance of confusion, without any compensating advantage; for this map is amply sufficient for the general student, and it is obviously beyond the plan of this work to furnish all the facts which would be required by a naturalist pursuing a special inquiry.

Next comes a Hyetographic map of the world, exhibiting the statistics of the amount and periods of the fall of rain over the globe. The relative quantities of rain are indicated by depth of shading, while coloured lines mark the limits of the zones within which precipitation is periodical or constant. It is accompanied by tables of the annual amount of rain over the globe as ascertained at a great number of points in the old and new world, both in the tropics and the temperate zones.

The River systems of Europe and Asia, displays the boundaries and comparative extent of the river basins and the seas to which they contribute their waters; with hydrographic tables, &c.

Part the third presents us with,—1. a map of Glaciers and glacial

phænomena founded on the observations of Prof. J. D. Forbes, Charpentier, Raymond, &c., with a descriptive treatise by the first-named gentleman. 2. The distribution of Carnivora, with a map of the district inhabited by the fur-bearing animals, together with the region of the whale and seal fishing in the northern hemisphere. 3. A Physical Chart of the Pacific, with the navigation, currents, temperature, &c.

Part the fourth,—1. a highly interesting map illustrating the phænomena of Volcanic action as exemplified in the regions visited by earthquakes and the distribution of volcanoes, accompanied by an extensive table of the geographical distribution of volcanoes, giving their position, date of eruption, height in feet, and the name of the "system" to which they belong. 2. a Rain map of Europe. 3. the Geographical distribution of Reptilia; one section given to the Testudines, Sauria and Batrachia, two others illustrating the positions of the Ophidia, innocuous and venomous, according to Schlegel, with tables showing the numbers and distribution over the globe and in the zoological provinces of that author.

Part the fifth,—1. a map of the Geographical distribution of Birds in two sections,—1, over the Globe; 2, over Europe. The data for the division and intensity of species in the first are furnished by Pompper's classification, arranged according to Cuvier's system; in this way the globe is divided into sixteen provinces, which are arranged into three groups according to the zones.

The divisions are altered in the general map in regard to Europe, which is made one undivided province. The orders taken in the general map are,—1. Rapaces; 2. Scansores; 3. Oscines; 4. Gallinaceæ; 5. Grallatores, and 6. Natatores; and the table of distribution shows that while in general the number of species is greatest in tropical countries, Europe forms such a striking exception, that it possesses more species than any other province except that of tropical America, more even than tropical Asia and the Sunda Islands together; but the gross number increases in the tropical provinces, and this holds good of all the single orders except that of the Natatores, this order decreasing toward the equator. Europe and tropical America possess the greatest number of Rapaces, while Scansores and Oscines predominate in the latter; Grallatores and Natatores are most numerous in Europe, and the greatest number of Gallinaceæ occur in tropical Asia. There is also a table of the birds of Europe based on the 'Systematic Catalogue' of Keyserling and Blasius. On the map are, 1. elevations exhibiting the perpendicular range in general and in the Alps. 2. Mountain Chains of North America, with Humboldt's plan of the volcano of Jorullo and a map of the Island of Trinidad. 3. an Ethnographic map of Great Britain and Ireland.

The whole of the maps are most beautifully engraved and coloured with the greatest care, and full justice is done to those whose devotion and perseverance have rendered such a work possible; indeed we think that the scientific world owes much to Prof. Berghaus and Mr. Johnston for such a magnificent exposition of its labours, since

we can scarcely imagine anything better calculated than this Atlas to impress the general public with a true idea of the value and interest of scientific pursuits. The work must indeed be regarded as one of the most valuable gifts ever offered by science to education.

A History of Inventions, Discoveries and Origins. By Prof. Beckmann. 4th ed. Edited by W. Francis, Ph.D. &c., and J. W. Griffith, M.D. &c.

From the title of this work it would at first appear that it had little to do with the subjects to which our pages are devoted, but under the third head, that of Origins, we find several articles which, although hardly to be considered as scientific, have considerable interest for the naturalist. The inquiries concerning the plants known to the ancients and the endeavours to settle their synonymy with modern species present a good example of the wonderful perseverance and earnestness which characterize German research even when its results are to be devoted to popular instruction.

In the article on the history of kitchen vegetables, the author, in addition to those commonly in use, refers shortly to several which are no longer considered worthy of cultivation. Speaking of the name of *Borago officinalis*, he says:—"Some of the old botanists have conjectured that it is derived from the word *corago*, which Apuleius, whose period is uncertain, gives as a synonym of *buglossum*. Some think that the reading in Apuleius ought to be *borago*; and others assert that *corago* is the true name, and arose from the quality which the plant has of strengthening the heart; consequently we ought properly to read *corago*, and not *borago*. It is probable that our forefathers, under the idea that their borage was the *buglossum* of the ancients and therefore had the property of strengthening the heart, threw the flowers into wine, that their spirits might by these means be more enlivened*.

"Our borage is certainly a foreign plant, and Cæsalpinus said that it was brought from other countries to Italy. Linnæus positively states that it first came from Aleppo; but I have not yet been able to find on what authority this assertion is founded."

There is a very interesting article on Kermes and Cochineal, containing a well-digested account of the œconomic history of these curious insects. It is stated that 1,569,120 lbs. of cochineal were exported from and consumed in this country in 1844, and that each pound contains 70,000 insects!

We do not quite agree with the editors in their opinion of plant-skeletons. This means of investigating structure, of stems especially, has been too much neglected, and is in fact almost the only means of acquiring a clear idea of relations of parts in some plants; such a means is the less to be dispensed with that we know so little of the subject. This book has been well-known in its former editions and its value fully appreciated, and great credit is due to the present

* Hence the old distich, "I, borage,
Give courage."